

OUTCOME OF ROTATOR CUFF REPAIR IN SNYDER TYPE C1 AND C2 LESIONS, CONSIDERING SMOKERS AND NONSMOKERS

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ABSTRACT

Objective: To evaluate the influence of smoking on the results from surgical repair of Snyder type C1 and C2 complete lesions of the rotator cuff. **Methods:** We evaluated 166 patients who had undergone surgical treatment for Snyder type C1 and C2 complete lesions of the rotator cuff, between June 2002 and December 2006. The inclusion criteria were a minimum follow-up period of 24 months and the absence of previous surgery on the affected shoulder. Patients with other associated injuries were excluded. We evaluated smoking and nonsmoking patients in accordance with the criteria of the World Health Organization (WHO). Female patients (119) predominated over male patients (47), and the mean age was

57 years (38 to 78). Out of the 166 patients evaluated, 21 were classified as smokers and 145 as nonsmokers. The final results were evaluated using the UCLA (University of California at Los Angeles) criteria and statistical analysis was performed using the Epi Info® software. **Results:** According to the UCLA criteria, smokers had a final average of 32.6 points, while non-smokers had 33.8. Postoperative statistical analysis revealed a difference between the two groups, such that non-smoking patients had a better outcome. **Conclusion:** Smoking interferes with the final results from repairs of small and medium-sized lesions of the rotator cuff.

Keywords – Arthroscopy; Shoulder/injuries; Shoulder/surgery; Shoulder Pain

INTRODUCTION

Smoking is considered to be a worldwide health problem that affects several systemic organs, and its consequences have been evaluated by a variety of medical specialties. Few studies have had the objective of correlating the effects from smoking with rotator cuff injuries. It is known that the rim of rotator cuff injuries

is hypovascular⁽¹⁾, and it can be suspected that cigarette users would have even greater diminution of this vascularization. Mallon *et al*⁽²⁾ found inferior postoperative results among patients who smoked. It has been asked whether these worse results might be consequent to worse preoperative lesions in patients who smoke, given that Baumgarten *et al*⁽³⁾ demonstrated that smokers tended to have larger lesions than did nonsmokers. Our

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study had the purpose of answering this question by evaluating patients whose injury size was similar before the operation.

Objective

To evaluate the influence of smoking on the surgical results from repairing complete lesions of the rotator cuff that were classified as types C1 and C2 by Snyder *et al*⁽⁴⁾.

MATERIAL AND METHOD

From June 2002 to December 2006, 1,291 videoarthroscopy procedures to treat the rotator cuff were carried out at the same clinic. From these, 166 patients with injuries classified as types C1 and C2 according to Snyder *et al*⁽⁴⁾. Using the Snyder criteria, joint injuries are in group A, bursal injuries are in group B and complete injuries are in group C. Snyder *et al* described C1 as small complete lesions of punctiform nature, and C2 as moderate (generally smaller than 2 cm), affecting only one tendon, without retraction. The inclusion criteria were a minimum follow-up period of 24 months and the absence of previous surgery on the affected shoulder. Patients who presented other associated lesions such as os acromiale, glenohumeral dislocation, SLAP lesions, calcareous tendinitis and lesions of the tendon of the long head of the biceps were excluded. Only smokers and nonsmokers were taken into consideration, in accordance with the World Health Organization (WHO) criteria⁽⁵⁾, while former smokers and light smokers were excluded. Out of the total of 166 patients evaluated, 21 were considered to be smokers (13%) and 145 were taken to be nonsmokers (87%). The mean follow-up was 34 months (range: 24 to 78). Female patients predominated (119; 72%) over male patients (47; 28%), and the mean age was 57 years (range: 38 to 78 years).

The videoarthroscopy procedures were carried out with the patients in lateral decubitus, and the limb to be operated was under traction. Titanium anchors were used, arranged in a single row, with simple stitches. All the rotator cuff injuries were completely closed, and acromioplasty was performed in all cases. The two groups of patients underwent the same postoperative routine, with six weeks of using a sling, followed by mobility gains and muscle strengthening.

The final results were assessed using the UCLA (University of California at Los Angeles) criteria⁽⁶⁾, which give scores for pain (1-10), function (1-10), elevation

(0-5), strength (0-5) and satisfaction (0 or 5), in order to group these results as excellent (34 and 35 points), good (28 to 33), reasonable (21 to 27) and poor (20 or less). The Epi Info[®] software (Kruskal-Wallis test; $p < 0.04$) was used for the statistical analysis.

RESULTS

The mean number of anchors used ranged from one to three in the two groups, with a mean of 1.3 anchors in the group of smokers and 1.1 for the nonsmokers. There was no statistical difference regarding the number of anchors. The smokers evolved from a preoperative UCLA score of 15.6 (minimum: 10; maximum: 21) to a postoperative score of 32.6 (minimum: 26; maximum: 35). The nonsmokers evolved from a preoperative UCLA score of 16 (minimum: 11; maximum: 21) to a postoperative score of 33.8 (minimum: 28; maximum: 35) (Figure 1). Taking into account the values that are considered excellent according to the UCLA criteria (34 and 35 points), 63% of the nonsmoking patients fitted into this group, while 47.6% of the smokers were in this group, in the post-surgical evaluation. In the statistical analysis (Epi Info[®]; Kruskal-Wallis test with $p < 0.04$), there was no significant difference between the two groups before the operation. However, there was a significant difference in the postoperative data between the two groups ($p = 0.0094$), such that the nonsmoking patients had better final results.

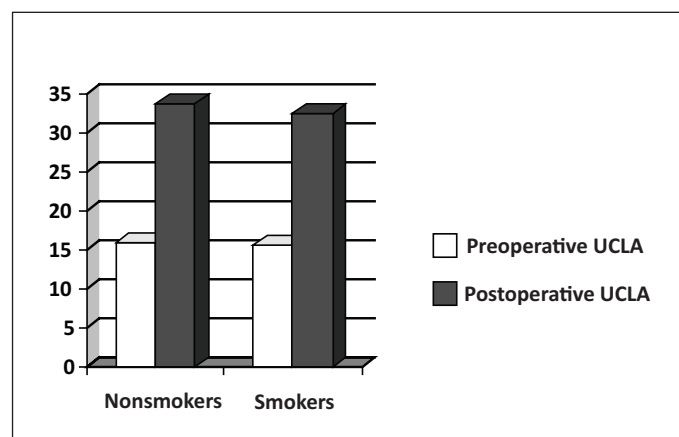


Figure 1 – Pre and postoperative UCLA.

DISCUSSION

Despite widespread studies within other field of medicine, the effect of cigarettes within orthopedics⁽⁷⁾ is still a sparsely covered topic. Specifically in the relation to the shoulder, few studies have been published. Galatz

et al⁽⁸⁾ used rats that were randomly subjected to a saline or a nicotine infusion pump, and the nicotine group had worse mechanical results from rotator cuff repairs. Kane *et al*⁽⁹⁾ found a higher rate of rotator cuff tears in the cadavers of smoking patients. In an analysis on open surgery, Mallon *et al*⁽²⁾ found worse results among smokers. In a study using ultrasound, Baumgarten *et al*⁽³⁾ not only found greater numbers of rotator cuff injuries in smokers, but also found that the injuries were bigger in this group. Even with these studies, one question persists: are the inferior results a direct consequence of cigarette use, or secondary to the larger lesions that smokers tend to present? To answer this question without this difference causing bias in assessing the results, we equalized the two groups and only evaluated patients with small and medium-sized lesions according to the classification of Snyder *et al*⁽⁴⁾. We also took into consideration the WHO criteria for smoking, since there seems to be some confusion in the criteria for cigarette use, such that each author used his own method for classifying the smoking. With all the exclusion criteria used, we greatly reduced the group size, from the number initially operated (1,291) to the number evaluated (166), but we consider that we created two homogenous groups, in which the only differential was whether or not cigarettes were used. There was no statistical difference regarding the number of anchors used. There was no statistical difference in comparisons between the

two groups before the operation, but the difference was significant after the operation. These results ratify the conclusions of Mallon *et al*⁽²⁾, who found that smokers had results that were inferior to those of nonsmokers. We found this even when only lesions of the same size were evaluated. In comparing the two studies, however, the postoperative statistical difference was greater in the work by Mallon *et al*⁽²⁾, such that nonsmokers had final results that were similar to those of our study, but smokers had much worse results. We believe that this was because smokers have a tendency to have bigger lesions, and such lesions were evaluated in that study, but not in ours. In analyzing the reasons that led to worse results among smokers, it has been considered that nicotine causes reduced vessel caliber, diminished fibroblast production and tissue hypoxia, with lower cell proliferation⁽⁸⁾. Thus, we suggest that three precautions should be taken when operating on smoking patients: (1) ask the patient to reduce his cigarette use (or preferably, to quit); (2) during the operation, debride the rim of the rotator cuff injury⁽¹⁾, thus providing a zone of better vascularization at the contact with the bone; and (3) consider the possibility of a greater period of postoperative immobilization for these patients.

CONCLUSION

Smoking interferes with the final result from repairs on small and medium lesions of the rotator cuff.

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